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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,112	11/13/2003	George H. Corrigan	10010484-2	7670

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HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P.O. Box 272400  
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EXAMINER

NGUYEN, LAM S

ART UNIT	PAPER NUMBER
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2853

DATE MAILED: 04/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/712,112	<b>Applicant(s)</b> CORRIGAN, GEORGE H.	
	<b>Examiner</b> LAM S NGUYEN	<b>Art Unit</b> 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 7, 16-21 and 24 is/are rejected.
- 7) ☒ Claim(s) 4, 6, 8-15, 22, 23 and 25 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some    \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>11/13/2003</u> . | 6) <input type="checkbox"/> Other: ____.  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 2, 7, 16, 18-21, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caillol et al. (US 4737800) in view of Bohorquez (US 5357081) and Doluca (US 6208127).

Caillol et al. disclose a fluid ejection device comprising:

an internal power supply path (FIG. 9, element 1);

a power regulator or a power delivery control loop (FIG. 9, elements 8, 9, M)

providing an offset voltage from the internal power supply path voltage (FIG. 9, the output of element 9);

a corresponding group of switches controllable (FIG. 9, elements 40a-40n) to couple a selected firing resistor (FIG. 9, elements 30a-30n) of the group of firing resistors between the internal power supply path and the offset voltage to thereby permit electrical current to pass through the selected firing resistor.

Caillot et al. do not disclose that the printhead comprises a group of nozzles and a corresponding group of firing resistors.

Bohorquez et al. disclose an inkjet recording head comprising a group of nozzles for ejecting ink drops when current is permitted to pass through a group of corresponding firing resistors (column 1, line 38-57).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the thermal printhead disclosed by Caillot et al. by replacing its heaters by firing resistors and corresponding nozzles for ejecting ink drops used in a thermal inkjet printhead as disclosed by Bohorquez. The reason of doing so is to achieve the advantages of thermal inkjet printers that are high speed and high printing quality as taught by Bohorquez (column 1, line 24-25).

In addition, Caillol et al. do not disclose that the power regulator includes a digital-to-analog converter (DAC) coupled to the internal power supply path and configured to receive a digital offset command representing a desired offset voltage to provide an analog offset voltage from the internal power supply path (**Referring to claims 2, 20**), a self-calibration circuit adapted to determine a regulation band of the power regulator defined by a lower set point offset voltage and an upper set point offset voltage wherein the self-calibration circuit includes a set point DAC up/down counter storing a set point offset voltage digital value which is provided as the digital offset command (**Referring to claims 7, 18-19, 21, 24**).

Doluca discloses a power regulator that includes a digital-to-analog converter (DAC) (FIG. 3, element 330) configured to receive a digital offset command (FIG. 3, element 302) representing a desired offset voltage to provide an analog offset voltage (FIG. 3, element 332) (**Referring to claims 2, 20**), a self-calibration circuit adapted to determine a regulation band of the power regulator defined by a lower set point offset voltage and an upper set point offset voltage (FIG. 3, elements 310, 300, and 320) wherein the self-calibration circuit includes a set point DAC up/down counter (FIG. 3, element 300) storing a set point offset voltage digital value

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which is provided as the digital offset command (FIG. 3, element 302) (**Referring to claims 7, 18-19, 21, 24**).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the power regulator in the printing system disclosed by Caillol et al. such that including a self-calibration circuit adapted to determine a regulation band of the power regulator defined by a lower set point offset voltage and an upper set point offset voltage as disclosed by Doluca. The motivation of doing so is to obtain “programmable voltage regulators that are used to provide output voltages that can be set to provide the output voltage required” as taught by Doluca (column 1, line 25-28).

2. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caillol et al. (US 4737800) in view of Bohorquez (US 5357081) and Doluca (US 6208127) as applied to claim 16, and further in view of Otsuki (US 6145961).

Caillol et al., as modified, disclose the claimed invention as discussed above except wherein the at least one fluid ejection device includes multiple fluid ejection devices.

Otsuki discloses a fluid ejection device including multiple fluid ejection devices, wherein each ejection device ejects different color ink for color printing (FIG. 6, elements 81-82).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the printing system disclosed by Caillol et al., as modified, such as including multiple fluid ejection devices for printing multiple colors as disclosed by Otsuki. The motivation of doing so is to provide a printing apparatus that is capable to print multiple colors as taught by Otsuki (Abstract).

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3. Claims 3, 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caillol et al. (US 4737800) in view of Bohorquez (US 5357081) and Doluca (US 6208127) as applied to claim 1, and further in view of Negishi et al. (US 4727382).

Caillol et al., as modified, disclose the claimed invention as discussed above and Bohorquez also discloses a feedback amplifier (FIG. 3, element 16) having a first input coupled to an input offset voltage, a second input coupled to a feedback line, and a output coupled to a drive line, a selected switch (FIG. 3, element 18) corresponding to a selected firing resistor (FIG. 3, element RH) has a control gate (FIG. 3, element 18) controlled by the drive line, and an internal power ground (FIG. 3, element Rr).

Caillol et al., as modified, do not disclose wherein the selected firing resistor of the group of firing resistor includes a first terminal coupled to the internal power supply and a second terminal coupled to the feedback line and the switch, wherein the drive line provides the offset voltage to the feedback line and the second terminal of the selected firing resistor through the selected switch.

Negishi et al. disclose a control device having a D/A converter (FIG. 2, element 5), a feedback amplifier (FIG. 2, element 6), and a switch (FIG 2, element Tr1) to control a load current (FIG. 2, element ILD) through a LD and a resistor (FIG. 2, element R2), wherein the resistor includes a first terminal coupled to the power supply +Vcc and a second terminal coupled to the feedback line and the switch (FIG. 2, element TR2), wherein a drive line provides an offset voltage (FIG. 2, element Vy) to the feedback line and the second terminal of the resistor through the switch (FIG 2, element Tr1).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the printing system disclosed by Caillol et al., as modified, such that connecting a terminal of the selected firing resistor to the feedback line so that the drive line provides the offset voltage to the feedback line and the second terminal of the selected firing resistor through the selected switch as disclosed by Negishi et al. The motivation of doing so is to be able to modulate the load current in order to produce high quality printing images as taught by Negishi et al. (Column 10, line 40-56).

*Allowable Subject Matter*

4. Claims 4, 6, 8-15, 22-23, and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Referring to claims 8, 22, 25:** The most pertinent art fails to disclose wherein the self-calibration circuit includes a set point controller receiving a fire pulse, a start calculation signal, and an in regulation signal which is activated based on the power regulator being in regulation, the set point controller activating a count signal to the set point DAC up/down counter at every received fire pulse in a first set point calculation operation occurring between a first active start calculation signal and a second active start calculation signal unless an active in regulation signal has been received during the first set point calculation operation, wherein an activate count signal causes the set point DAC up/down counter to increment or decrement. Therefore, the claimed invention is not disclosed by the cited prior art.

**Referring to claim 4:** The most pertinent art fails to disclose wherein the self-calibration circuit includes a regulation detector configured to compare the offset voltage at the first input of

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the feedback amplifier and the offset voltage on the feedback line and provide an in regulation signal which is activated based on the power regulator being in regulation. Therefore, the claimed invention is not disclosed by the cited prior art.

**Referring to claim 6:** The most pertinent art fails to disclose wherein the selected switch is coupled between the internal power supply path and the first terminal of the selected firing resistor. Therefore, the claimed invention is not disclosed by the cited prior art.

**Referring to claim 12:** The most pertinent art fails to disclose wherein the set point DAC up/down counter receives a load signal and wherein a preset set point offset voltage digital value is loaded into the set point DAC up/down counter via the data lines in response to an active load signal. Therefore, the claimed invention is not disclosed by the cited prior art.

**Referring to claims 9-11, 13-15, 23:** They are allowable because they depend directly/indirectly on claim 8, 12, or 22.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (571)272-2151. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D MEIER can be reached on (571)272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.




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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LN

March 31, 2004

  
HAI PHAM  
PRIMARY EXAMINER